Request for Proposals
by
The Appalachian Regional Commission
for
An Assessment of Potential Energy Efficiency Gains in the Appalachian Region

Appalachian Regional Commission
1666 Connecticut Ave., NW
Washington, D.C. 20009-1068

July 30, 2007

Proposals due on or before August 27, 2007

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I. Overview: The Appalachian Regional Commission (ARC) invites proposals from qualified researchers and consultants to assess the potential long-term energy efficiency gains for the Appalachian Region over current baseline projections from introducing a range of advanced efficiency standards for each energy end-use sector, and to detail the economic and environmental impacts from the technologies and investments required to attain these objectives. The ARC is a federal-state partnership established in 1965 to promote social development and economic competitiveness of the Appalachian Region and to bring the Region closer to parity with rest of the nation.[1] In 2006 ARC adopted an Energy Blueprint which set forth as its first strategic goal to "…promote energy efficiency in Appalachia to enhance the Region's economic competitiveness." The Commission's purpose in conducting this research is to assess the policy incentives necessary to promote the adoption of economically feasible advanced energy efficiency investments that can reduce energy bills for households, businesses, and the public sector and stimulate job creation in the Region.

II. Scope of Work
This research project will analyze current and pending federal and state energy efficiency policies (for the 13 Appalachian states), develop a long-term regional energy baseline projection, specify alternative investment scenarios based on the implementation of advanced energy efficiency measures as compared to current policies and forecasts, and assess the economic and environmental effects of such investments. Specific topics that should be included in a proposal are:

1. Review the existing state and federal efficiency programs, incentives and measures and characterize the current energy codes and standards prevailing in the region and those that are assumed in major forecasts such as the Energy Information Administration Annual Energy Outlook, 2007.
2. Develop a regional baseline forecast of energy consumption for each end-use sector including residential, commercial, industrial, and transportation demand for the next 15 to 20 years for the Region.
3. Specify alternative scenarios for efficiency gains in each sector over the chosen forecast period based on technology that would be economically feasible given a credible policy framework of incentives and programs at the federal and state levels.
4. Estimate the economic and environmental impact of energy efficiency savings and the potential net impact on jobs in the Region, including direct jobs in the energy supply sectors, as well as construction, renovation, and efficiency-related businesses and indirect jobs among manufacturing suppliers and service businesses.

[1] For a current listing of the economic designations of the 410 Appalachian counties see: http://www.arc.gov/index.do?nodeId=58.

5. Assess the regional policy environment to identify opportunities for realizing economically feasible advanced efficiency gains that can stimulate job creation in the Region.

The report should be written for a non-technical audience and fully relate the narrative to all descriptive statistics, analyses, graphs and tables. Detailed data and methodological discussions should be included in appendices.

Deliverables

The contract will require a draft and final report with an executive summary. The final report suitable for photocopying, an electronic copy of the final report, and an electronic data base (in an agreed upon software format) with a complete data dictionary must be submitted upon completion of the project.

III. Methodology

The successful applicant will develop a complete methodology to analyze the topics specified in the scope of work.

The methodology should include:

- A review of types of current policies, codes and energy efficiency standards extant in the Appalachian Region;
- Specification of the data sets for an analysis of energy use by sector, with public or proprietary data sources identified;
- Methods for statistical analysis and economic modeling of the effects of the scenarios, and costs of acquiring models and data for conducting the analysis;
- Discussion of limitations for specific data sets and methods to address these issues, and issues of on geographic coverage and/or aggregating geographical sub-regions to provide adequate coverage, and;
- Discussion of methods for specifying a business-as-usual scenario (including incremental efficiency gains from market-driven processes) and advanced energy efficiency scenario(s) that would be technically and economically feasible given a credible policy framework of incentives and public programs.

Proposals can offer other methodological procedures as needed.

IV. Cost and Timing

The Commission rates this research project as a Large-scale research project according to ARC's rating of the level of effort for conducting research: Major research projects $250k-$300k+; Large–scale $150 to $249k; Medium–scale $75k to $149K; Small–scale $25k to $74k; Research Brief less than $25k.

The contract will be a FIRM FIXED-PRICE CONTRACT. The Commission anticipates that the research will take 10 to 12 months to complete.

Overhead Policy
The Appalachian Regional Commission's policy on allowable indirect overhead costs for university-based research has been to permit universities to charge the same rates charged to their own state agencies. For the purposes of the project under current discussion, an indirect overhead of 15 percent would be in keeping with research contracts of this size.

V. Evaluation of Proposals

All proposals will be evaluated based on the following criteria:

- Clear and complete understanding of the study objectives and tasks;
- Command of existing energy efficiency analyses and policy;
- Complete, clearly articulated, logical study design and technically competent methodology;
- Demonstrated ability to synthesize and interpret research findings in a credible and useful manner;
- Qualifications, relevant prior experience, and capability to carry out and support the project in a timely fashion;
- A credible management proposal;
- The cost-effectiveness of the proposed project design.

VI. Proposal Submission

An original and three copies of the proposal must be submitted to the States Washington Office, Appalachian Regional Commission, 1666 Connecticut Avenue, NW, Suite 700, Washington, D.C., 20009-1068, on or before **August 27, 2007**. For information contact Greg Bischak by phone at (202) 884-7790 or by e-mail at gbischak@arc.gov.

VII. Background on Appalachia's Energy Consumption and Production
Appalachia's aggregate energy consumption patterns differ from those of the United States as a whole because the Region exports electrical power. As Table 1 shows, Appalachia's higher share of coal and nuclear electric energy consumption reflects the use of these fuel sources to generate electricity for local consumption and to export to surrounding states. It is noteworthy that the Region's share of high-cost natural gas is lower than the nation's, while its share of "other sources," which is largely made up of renewable energy sources, is lower than the nation's, even though the Region possesses considerable potential in renewable energy sources.

Appalachia's electrical generation capacity and output is far more dependent on coal than the nation's. As Figure 1 shows, more than three-quarters of the Region's electrical output is derived from coal, and 16.5 percent is derived from nuclear power, while gas and oil together contribute about 3 percent. By contrast, the nation as a whole generates

half its electricity from coal, 20 percent from nuclear power, and more than 21 percent from gas- and oil-fired power plants.

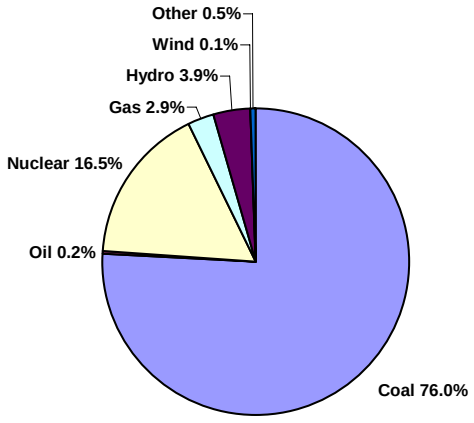
Table 1

United States and Appalachian
Energy Consumption Estimates by Source, 2002

	United States		Appalachia	
	Trillion BTUs*	Share	Trillion BTUs*	Share
Coal	21,903	22%	3,532	38%
Natural Gas	23,806	24%	1,415	15%
Petroleum	38,400	39%	2,840	31%
Nuclear Electric	8,143	8%	1,020	11%
Hydroelectric	2,689	3%	160	2%
Biomass	2,571	3%	317	3%
Other	570	1%	4	0%
Total (excluding losses)	98,082	100%	9,287	100%

**British Thermal Units (BTUs) refers to a standardized measure of energy content.*
Source: Energy Information Administration, 2006; Appalachian estimates prepared by ARC based on EIA state-level data.

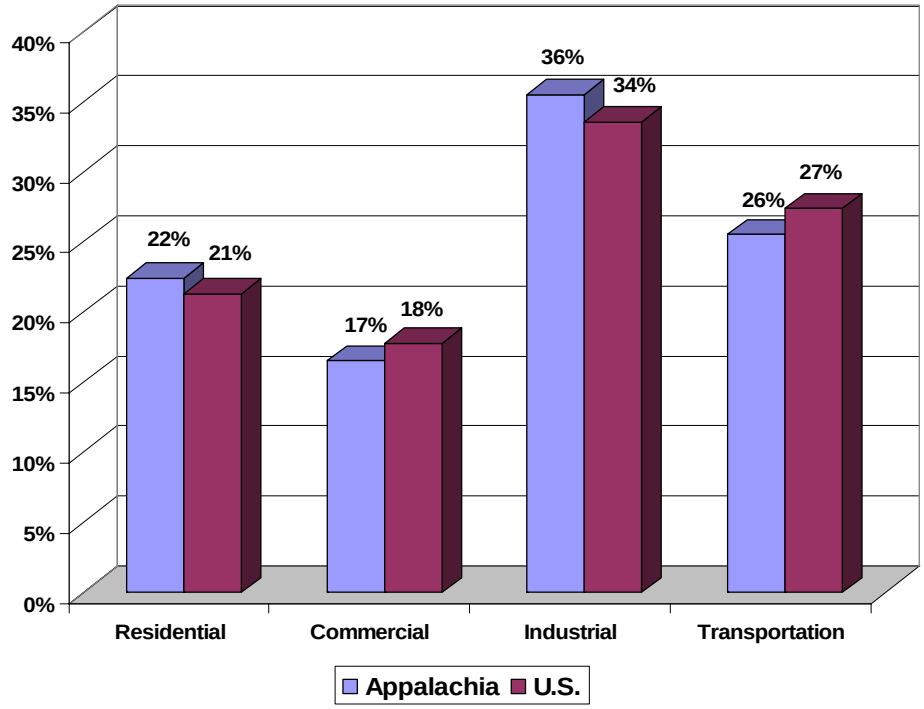
Figure 1
Appalachia's Electrical Generation Output by Fuel Source, 2004



Source: Electrical generation data derived from Energy Information Administration, *EIA-860 Database Annual Electrical Generation Report and Electric Power Monthly*.

Another dimension of the Region's energy consumption is how it uses its energy in the residential, commercial, industrial, and transportation sectors. As Figure 2 shows, Appalachia uses slightly more of its energy on residential uses than does the United States as a whole. This probably reflects the lower efficiency of the Region's housing stock. Appalachia's commercial and transportation sectors are relatively smaller than the nation's, so they consume less energy; while the Region's greater manufacturing and electrical production is reflected in the higher share of the industrial sector's energy consumption.

Figure 2
United States and Appalachian Energy Consumption Shares by End-Use Sectors, 2002



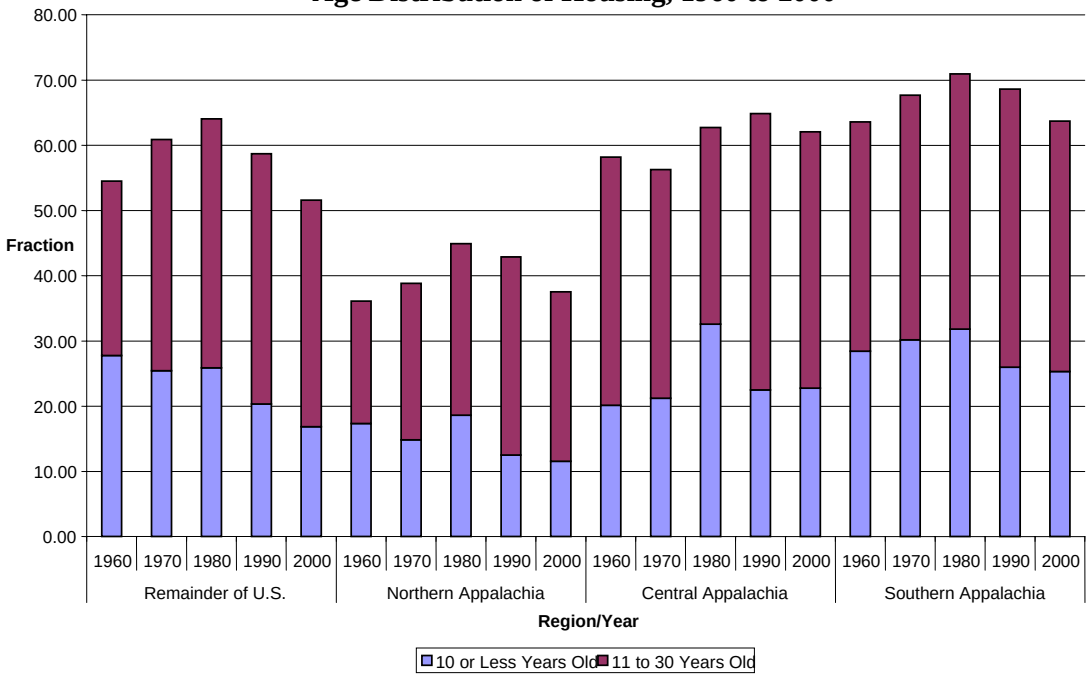
Source: Energy Information Administration, 2006; Appalachian estimates prepared by ARC based on per capita estimates derived from EIA state-level data.

Appalachian Energy End Use Consumption by Sector:

Residential Sector: Analysis of decennial census long-form data on the age of the Appalachian housing stock and household heating and air conditioning, coupled with anecdotal evidence, indicate that the housing stock is older and less efficient than elsewhere in the nation. The age of the housing stock is shown in Figure 3 which depicts the fraction of the housing stock that is 10 years old or newer, and the fraction that is 11 to 30 years old. For the U.S. as a whole, the fraction of housing that is 10 years old or newer has been declining since 1960. However, the fraction of housing built over the previous 30 years increased until 1980 and then decreased. This reflects the aging of the housing stock, especially the aging of housing built during the boom after World War II. Northern Appalachia follows this general pattern although at a lower level. In 1960

approximately 65% of housing in Northern Appalachia was older than 30 years old; for the remainder of the U.S. only 45% was older than 30 years. Central and Southern Appalachia displays a different pattern. In general, the age of the housing stock has become relatively newer. Both Central and Southern Appalachia show a boom in new construction during the 1970s. In addition, the rate of new construction continues to be above that for the remainder U.S. throughout 1980s and 1990s. However, newer homes tend to offer both greater energy efficiency and more amenities and square footage, thus the net effect of these changes on energy consumption patterns is unclear.

Figure 3
Age Distribution of Housing, 1960 to 2000



Source: *Standards of Living in Appalachia, 1960 to 2000* by Dan Black, Mark Mather and Seth Sanders, Population Reference Bureau, forthcoming, 2007.

Over the last 40 years, there has been convergence in the types of fuels used to heat homes in Appalachia and the rest of the United States. In 1960, about 42 percent of Appalachian homes were heated with wood or coal, more than twice the share of homes outside of the region (19 percent). By 2000, the proportion of homes heated with wood or coal had fallen dramatically, particularly in the Central region, where there was a 60-percentage-point drop. Air condition data are not available for 1990 and 2000, although analysis of utility data in region shows the increased use of air conditioning. Between 1960 and 1980, the proportion of Appalachian homes with at least some air conditioning increased from 7 percent to 44 percent.

Commercial: Anecdotal evidence from around the Region indicates that the commercial building stock in the three Appalachian sub-regions parallel, somewhat, the conditions of the residential sectors, with the northern sub-region possessing the oldest commercial building stock, the central sub-region having relatively old commercial buildings, with

the southern sub-region having the newest building stock. Government buildings in particular are reported to be among the oldest of the buildings throughout the Region, with school building being reported as among the oldest according to testimonies in regional forums held in 2006.

Industrial: Appalachia's economy is more manufacturing intensive than the rest of the nation and possesses a significant concentration in several energy intensive sectors such as steel, aluminum, chemicals, plastics, rubber, wood products, and paper production. Table 2 below shows relative importance of these sectors as measured by value-added manufacturing by sector for 2005. Several of the Appalachian states have industrial efficiency programs in place to assist industry in implementing state-of-art energy management techniques, as well as university-based industrial assessment centers, and utility rebate programs.

2005 Appalachian Manufacturing Value-Added by Sector
Billions of 1996 Fixed Dollars

Wood product mfg	3.717
Nonmetallic mineral prod mfg	5.798
Primary metal mfg	8.035
Fabricated metal prod mfg	11.792
Machinery mfg	9.471
Computer, electronic prod mfg	18.826
Electrical equip, appliance mfg	5.311
Motor vehicle mfg	8.041
Transportation equip mfg. exc. motor vehicles	3.547
Furniture, related prod mfg	5.886
Miscellaneous mfg	3.847
Food mfg	8.501
Beverage, tobacco prod mfg	3.446
Textile mills	4.095
Textile prod mills	4.253
Apparel mfg	3.893
Leather, allied prod mfg	0.188
Paper mfg	4.888
Printing, related support activities	3.106
Petroleum, coal prod mfg	1.173
Chemical mfg	12.236
Plastics, rubber prod mfg	9.467

Source: REMI, 2005

Transportation: Given the lack of public transportation in most Appalachian communities, most families rely on cars and trucks to get to work, school and stores. Census data indicate that the average number of cars and trucks per household is roughly equal in Appalachia and in the remainder of the United States. Between 1980 and 2000 (data are not available for earlier years), the average number of cars and trucks held steady at 1.6 or 1.7 per household in Appalachia and in the United States as a whole. Regional traffic demand forecasts for the Appalachian Region have been developed for ARC by Cambridge Systematics for a large scale study of regional transportation needs.

This study has built a detailed travel demand forecast for the Region based on the Bureau of Transportation Statistics' Freight Analysis Framework II (FAF2) which forecasts travel volumes for freight traffic on the national highway systems to 2035. This framework has been regionalized to develop a matrix of origin and destination for truck freight traffic that is disaggregated into through-traffic and regional traffic. In addition, auto business and non-business traffic demand has been estimated for the region based on several demographic forecasts and a transportation modeling system. These data will provide a solid basis to project a baseline of energy use by the transportation sectors based on volumes by vehicle type and vehicle miles traveled.

Appalachian State Energy and Efficiency Policies: Recent years have seen comprehensive energy plans either passed or under consideration in many Appalachian states. The broad outlines of these state plans are summarized in ARC's Energy Blueprint including efficiency rebates, grant and loan programs, net metering, public benefit programs, tax incentives, and renewable portfolio standards (see: *Energizing Appalachia*, http://www.arc.gov/index.do?nodeId=3118).

Energy efficiency programs, however, do face implementation obstacles such as relatively low energy costs in the central subregion which tends to discourage efficiency investments. Another case is that often energy audit recommendations are not implemented due to lack of expertise or available funds. In addition architects, builders, and home manufacturers often lack incentives to apply energy-efficient strategies in the design and construction of commercial and residential buildings. These obstacles must be addressed as efficiency programs are enhanced through further incentives, public investments, research, outreach and training programs.

VIII. Background on the Appalachian Regional Commission

The Appalachian Regional Commission is a federal-state partnership established in 1965 by the Appalachian Regional Development Act to promote economic and social development of the Appalachian Region. The Act, as amended in 2002, defines the Region as 410 counties comprising all of West Virginia and parts of Alabama, Georgia, Kentucky, Maryland, Mississippi, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, and Virginia—an area of 200,000 square miles and about 22.9 million people. To promote local planning and implementation of ARC initiatives, the Commission established 72 Local Development Districts (LDDs) comprising groups of counties within each of the 13 states. The Commission has 14 members: the governors of the 13 Appalachian states and a federal co-chairman, who is appointed by the president.

For 42 years, the Commission has funded a wide range of programs in the Region, including highway corridors; community water and sewer facilities and other physical infrastructure; health, education, and human resource development; economic development programs and local capacity building, and leadership development. The rationale for ARC's Area Development program is to provide the basic building blocks that will enable Appalachian communities to create opportunities for self-sustaining

economic development and improved quality of life. These strategic goals were agreed upon after an exhaustive, year-long strategic planning process involving federal, state, and local officials and citizens that focused investment in four goal areas:

1. Increase job opportunities and per capita income in Appalachia to reach parity with the nation.
2. Strengthen the capacity of the people of Appalachia to compete in the global economy.
3. Develop and improve Appalachia's infrastructure to make the Region economically competitive.
4. Build the Appalachian Development Highway System to reduce Appalachia's isolation.

Area Development funds are allocated to the states on a formula basis and each state has wide discretion in deploying those resources across the four goal areas based on local needs and state priorities. However, an overarching policy mandated by Congress is that ARC resources are to be targeted to those counties with the greatest needs—those still the farthest behind that are designated as "distressed."

In FY 2007, the Commission's definitions of economic development levels designated 78 counties as distressed because of high rates of poverty and unemployment and low rates of per capita market income compared to national averages; 78 counties are characterized as "at-risk"; 221 counties were designated transitional, with higher than average rates of poverty and unemployment and lower per capita market income; 26 counties have nearly achieved parity with national socioeconomic norms and are now designated as competitive and; 7 counties have reached or exceeded national norms and are now designated as attainment counties. See ARC's web site for more details (http://www.arc.gov/).

IX. Outline of Proposal Contents

A. Technical Proposal.

Please note that the core narrative of the proposal should not exceed 15 pages, (not including the abstract and accompanying longer resumes and boilerplate organizational background materials which should be included as appendices.)

1. ***Summary Abstract (350 words).*** In this section, provide a brief abstract of the technical portion of the proposal by summarizing the background, objectives, proposed methodology, and expected outputs and results of the research.

2. ***Methodology.*** State the step-by-step approach or methods intended to accomplish all the tasks specified in this RFP. The proposal should provide a detailed explanation of the methodologies to be used, describe the limits of the selected methods, and justify why the methods were selected over others. The proposal should identify the points and tasks in this research project that will require participation by the Commission and ARC staff. Further, the statement should identify specific information needs according to sources, procedures, and individual tasks of the research that may need to be supplied by the Commission. Finally, the proposal should identify any difficulties that may be encountered in this project and propose practical and sound solutions to these problems.

3. ***Project Work Plan and Milestones.*** The proposal should describe the phases into which the proposed research can be logically divided and performed together. Flow charts may be included as necessary. A schedule of milestones and deadlines should be specified for the completion of various work elements, including information collection, interviews, surveys, analyses, quarterly progress reports, preliminary drafts for review, and final draft reports.

4. ***Key Personnel.*** Personnel performing the research must be described in this section in terms of numbers of people and their professional classification (e.g., project director, economist, analyst, statistician, etc.). Brief resumes of the education and relevant experience of the principal investigator, co-investigator, and other key personnel are required in the core of the proposal (longer resumes can be included in an appendix). The selected contractor will be required to furnish the services of those identified in the proposal as key personnel. Any change in key personnel is subject to approval by ARC.

B. Management Proposal

The resource capability and program management for planning and performing the research will be considered in the proposal selection process.

1. ***Business Management Organization and Personnel.*** Furnish a brief narrative description of the organization, including the division or branch planned to perform the proposed effort, and the authority responsible for controlling these resources and personnel (longer boilerplate materials can be included in appendix).

2. ***Staffing Plan.*** A staffing plan is required that describes the contractor's proposed staff distribution to accomplish this work. The staffing plan should present a chart that partitions the time commitment of each professional staff member to the project's tasks and schedule. In addition, the proposal should include a detailed description of activities for key project-related personnel and anticipated deliverables. Finally, the proposal should identify the relationship of key project personnel to the contracting organization, including consultants and subcontractors.

3. ***Relevant Prior Experience.*** The proposal must briefly describe the qualifications and experience of the organization and the personnel to be assigned to the project. An appendix can include detailed information on direct experience with the specific subject-matter area and organizations, addresses, contact persons, and telephone numbers for such references.

4. ***Contract Agreement Requirements.*** This section of the proposal should contain any special requirements that the contractor wants to have included in the contract.

C. Cost Proposal

Each proposal submitted must contain all cost information. The cost information should include direct labor costs (consistent with the staffing plan), labor overhead costs, transportation (if anticipated), estimated cost of any subcontracts, other direct costs (such as those for data bases and economic models), university overhead, total direct cost and overhead, and total cost and fee or profit.

In addition, ARC may choose to request that the selected contractor formally present and discuss study findings with key Appalachian officials in Washington, D.C. This activity will be over and above routine meetings with ARC staff during the course of the project, and the contractor should price its part in this activity separately, assuming travel to a one-day meeting.

The contract awarded for this research project will be a FIRM FIXED-PRICE CONTRACT, with payments on a quarterly schedule. The contract terms shall remain firm during the project and shall include all charges that may be incurred in fulfilling the terms of the contract.